

App. No. 10/719,629

Reply to Office action of August 22, 2006

REMARKS/ARGUMENTS**A. Summary of the Amendment**

Reexamination and reconsideration are courteously requested. By way of the present amendment, claims 1 and 10 are amended. No claims are added, although claim 7 and 16 are canceled. Thus, claims 1 to 6, 8 to 15, and 17 to 35 remain pending for the Examiner's consideration, with claims 1, 10, 17, and 22 being independent claims.

Although the present amendment is made after a final Office Action, entry of the amendment is believed to be in compliance with Rule 116 since the amendment is merely the incorporation of features from dependent claims 7 and 16 into respective independent claims 1 and 10. Thus, no new issues are presented by way of the current amendment for the Examiner's consideration. Furthermore, the amendment is believed to place allowable subject matter into the pertinent independent claims, thereby placing the claims into condition for allowance.

B. Allowable Subject Matter

The examiner has acknowledged that claims 14, 20, and 27 are directed to allowable subject matter. Applicants thank the Examiner for a thorough examination of these claims. It is also believed that claim 7 was intended to be acknowledged as being directed to allowable subject matter, as the features recited in claim 7 are identical to those recited in allowable claim 20. For this reason, claim 7 is incorporated into independent claim 1.

C. Rejections Under 35 U.S.C. § 102(e)

Claims 1, 3 to 4, 6, 8 to 10, 17, and 21 to 22 are rejected as being anticipated by U.S. Patent No. 6,759,151 (Lee '151). These rejections are respectfully traversed.

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Regarding independent claim 1, the current amendment incorporates claim 7 therein. As conceded by the Examiner, Lee '151 fails to anticipate claim 7. For at least this reason, the rejection of claim 1 and those claims depending therefrom should be withdrawn.

Regarding independent claim 10, the current amendment incorporates claim 16 therein. As conceded by the Examiner, Lee '151 fails to anticipate claim 16. For at least this reason, the rejection of claim 10 and those claims depending therefrom should be withdrawn.

Regarding independent claim 17, the claim as pending recites, *inter alia*:

- a) a silicon carbide or silicon nitride substrate, and
- b) a diffusion barrier coating in the range of 99 to 100% pure Si_3N_4 , SiC or Si_2ON_2 on said substrate.

Turning briefly to the present specification at paragraphs 0026 to 0027, the benefits of this diffusion barrier coating is explained. Cations (i.e. from lanthanum or yttrium compounds) that are commonly produced as a result of sintering aids used to create ceramic substrates are likely to diffuse out of the substrate and into a protective coating formed thereon. The diffusion barrier coating of the present invention, i.e. having substantially pure silicon ceramics or oxynitrides, allows the use of such sintering aids without degrading overlying oxidation barrier coatings or environmental barrier coatings.

Nowhere does Lee '151 disclose such a diffusion barrier coating formed on a silicon-carbide-based substrate or a silicon nitride-based substrate. Lee '151 discloses a substrate (10) that includes silicon metal alloys or silicon ceramics such as silicon carbide and silicon nitride (col. 5, lines 20 to 37). Lee also discloses a bond coat (16) formed directly on the substrate, but fails to teach or suggest that the bond coat includes 99 to 100% pure Si_3N_4 , SiC or Si_2ON_2 as recited in present claim 17. None of the other layers in the multilayer article disclosed in Lee '151 include any type of silicon-based material whatsoever. Without providing any disclosure of a diffusion barrier coating formed over a silicon-based substrate, Lee '151 clearly fails to anticipate the claims. For this additional reason, the rejection of claim 17 and those claims depending therefrom should be withdrawn.

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Finally, regarding independent claim 22, the claim as pending recites, *inter alia*:

- a) an oxidation barrier coating of scandium disilicate;
- b) an environmental barrier coating formed on the oxidation barrier coating and comprising either a tantalum oxide alloy or a mixture including scandium disilicate and;
- c) a thermal barrier coating formed on the environmental barrier coating and comprising stabilized zirconia.

Firstly, nowhere in Lee '151 is there any disclosure of scandium disilicate in any layer of the multilayer coating. Lee '151 discloses various protective coatings that may include one or more of several different disclosed metal silicides, including mullite and various other aluminosilicates and rare earth silicates. However, none of the protective coatings disclosed by Lee includes a metal disilicide, meaning a metal compound that includes or is formed from the disilicate ion $\text{Si}_2\text{O}_7^{6-}$.

Also, Lee '151 fails to disclose a stabilized zirconia layer formed over a layer containing any of the materials defined as part of the environmental barrier layer recited in claim 22. At best, Lee '151 discloses a stabilized zirconia outer layer as an alternative to a tantalum oxide alloy outer layer, but does not disclose the two as separate, overlying layers. Since Lee '151 fails to teach or suggest the various layers as presently claimed, the rejection of claim 22 should be withdrawn.

D. Rejections Under 35 U.S.C. § 103(a)

Claims 1 to 13, 15 to 19, 21 to 16, and 28 to 35 are rejected as being unpatentable over U.S. Patent No. 6,733,908 (Lee '908) in view of Lee '151. These rejections are respectfully traversed.

Regarding independent claim 1, the claim is amended to include the features of claim 7. Claim 7 is identical to allowable claim 20, and is therefore believed to place claim 1 in

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condition for allowance. It is recognized that claim 1, as amended, is different in scope from claim 20. However, for purposes of patentability, the incorporation of claim 7 into claim 1 should place claim 1 into condition for allowance since neither of the Lee references teaches or suggests an environmental barrier coating including tantalum oxide alloyed with one oxide selected from the group of lanthanum oxide and alumina. For at least this reason, the rejection of claim 1 and those claims depending therefrom should be withdrawn.

Regarding claims 10 and 22, each of these claims recites, *inter alia*:

- a) an environmental barrier coating comprising either a tantalum oxide alloy or a scandium silicate mixture; and
- b) a thermal barrier coating formed on the environmental coating, and comprising stabilized zirconia.

Neither Lee reference teaches or suggests a stabilized zirconia layer formed over a layer containing any of the materials defined as part of the environmental barrier layer recited in claims 10 and 22. At best, Lee '908 discloses a stabilized zirconia outer layer. Lee '151 also discloses a stabilized zirconia outer layer but only as an alternative to a tantalum oxide alloy outer layer, but does not disclose the two as separate, overlying layers. Neither of these references, alone or in combination, teaches or suggests the various layers as presently claimed. Consequently, the rejection of claims 10 and 22, and those claims depending therefrom, should be withdrawn.

Finally, regarding independent claim 17, the rejection is respectfully traversed since Lee '908 fails to compensate for the above-discussed deficiencies of Lee '151. Nowhere does either of the Lee references disclose the diffusion barrier coating defined in claim 17 formed on a silicon-carbide-based substrate or a silicon nitride-based substrate. Lee '908 discloses a substrate (12) that includes silicon metal alloys or silicon ceramics. Lee '908 also discloses a bond coat (18) formed directly on the substrate, but fails to teach or suggest that the bond coat includes 99 to 100% pure Si_3N_4 , SiC or Si_2ON_2 as recited in present claim 17. None of the other layers in the multilayer article disclosed in Lee '908 include any type of silicon-based material whatsoever. Without providing any disclosure of a diffusion barrier coating formed

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over a silicon-based substrate, Lee '908 clearly fails to compensate for the deficient teachings of Lee '151. For this additional reason, the rejection of claim 17 and those claims depending therefrom should be withdrawn.

E. Conclusion

In view of Applicant's amendments and remarks, it is respectfully submitted that Examiner's objections and rejections have been overcome. Accordingly, Applicants respectfully submit that the application is now in condition for allowance, and such allowance is therefore earnestly requested. Should the Examiner have any questions or wish to further discuss this application, Applicants request that the Examiner contact the Applicants attorneys at the below-listed telephone number. If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent abandonment on this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

Dated: Oct. 23, 2006

By: 

David K. Benson
Reg. No. 42,314
(480) 385-5060